INFORMATION SHEET

ORDER NO. R5-2006-XXXX NPDES NO. CA0078034 CITY OF WILLOWS AND ECO RESOURCES, INC. WILLOWS WASTEWATER TREATMENT PLANT GLENN COUNTY

GENERAL INFORMATION

The City of Willows and ECO Resources, Inc. (hereafter collectively referred to as Discharger) submitted a Report of Waste Discharge dated 22 September 2005, and applied to renew its permit to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Willows Wastewater Treatment Plant to Agricultural Drain C, which is tributary to Logan Creek and to Glenn-Colusa Irrigation District (GCID) Lateral 26-2, both of which are tributary to the Colusa Basin Drain. The Discharger is currently regulated under Waste Discharge Requirements Order No. R5-01-066 (NPDES No. CA0078034), adopted by the Central Valley Water Board on 16 March 2001.

The City of Willows owns a wastewater collection, treatment, and disposal system, and provides sewerage service to the City of Willows and Northeast Willows Community Service District in Glenn County. ECO Resources, Inc. operates the WWTP. The treatment plant is in Section 15, Township 19 North, Range 3 West of the Mt. Diablo Base Line and Meridian. Treated municipal wastewater is discharged to Agricultural Drain C and may discharge to GCID Lateral 26-2, waters of the United States.

The current treatment system consists of a comminutor, primary aeration ponds, stabilization ponds, and disinfection.

The City of Willows is currently constructing plant improvements to upgrade the processes to meet the requirements included in the existing NPDES permit. Upon completion of the plant upgrades the treatment system will consist of influent screening, extended aeration activated sludge with secondary clarifiers, continuous backwash filters, disinfection with sodium hypochlorite, dechlorination using calcium thiosulfate, equalization and emergency storage ponds, and sludge storage lagoons.

The facility is in the Colusa Trough Hydrologic Sub Area No. 520.21, as depicted on interagency hydrologic maps prepared by the California Department of Water Resources in August 1986.

BENEFICIAL USES

The receiving streams are Agricultural Drain C and GCID Lateral 26-2, which are tributary to the Colusa Basin Drain. Based on the available information, the worst-case dilution is assumed to be zero to provide protection for the receiving water beneficial uses. The impact of assuming zero dilution within the receiving water is that discharge limitations based on acute and chronic toxicity are end-of-pipe limits with no allowance for dilution within the receiving water.

The beneficial uses of Agricultural Drain C and GCID Lateral 26-2 are not individually identified in the Basin Plan. However, the Basin Plan requires that the beneficial uses of any specifically identified water body apply to its tributary streams. GCID Lateral 26-2 is used for irrigation of crops and is used at times to supply water to the Sacramento Wildlife Refuge. Upon review of the flow conditions, habitat values, and beneficial uses of Agricultural Drain C and GCID Lateral 26-2, the Central Valley Water Board finds that the beneficial uses identified in the Basin Plan for the Colusa Basin Drain are applicable to Agricultural Drain C and GCID Lateral 26-2. The Basin Plan identifies the following beneficial uses for the Colusa Basin Drain: agricultural irrigation and stock watering; water contact recreation, including canoeing and rafting; warm and potential cold freshwater aquatic habitat; warm water fish migration habitat; warm water spawning, reproduction, and/or early development habitat; and wildlife habitat.

State Water Resources Control Board Resolution 88-63 "Sources of Drinking Water" provides that "All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards with the exception of: ...2.b. The water is in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters...". Agricultural Drain C and GCID Lateral 26-2 meet the criteria for an exemption from the beneficial use of municipal and domestic supply.

The beneficial uses of groundwater in the area of the Willows Wastewater Treatment Plant are municipal and domestic water supply, agricultural supply, and industrial service and process supply.

BASIS FOR PERMIT REQUIREMENTS

The Discharger operates a publicly owned wastewater treatment facility, and therefore, is subject to the USEPA secondary treatment regulations at 40 CFR 133.

Discharge Prohibitions

Prohibitions on bypass, nuisance, and discharges that occur in a manner different than described by the Order are retained from Order No. R5-01-066 and/or are consistent with objectives of the Basin Plan, as required by the California Water Code and the Clean Water Act (CWA), to protect the beneficial uses of waters of the State.

Establishment of Mass-Based Effluent Limits and Effluent Flow Limit

This Order establishes concentration-based and mass-based effluent limits. The mass-based effluent limits are calculated using the concentration-based limits and the design effluent flow rate for the facility as provided by the Discharger (1.12 mgd currently, 1.2 mgd after upgrade).

Dilution Considerations for Effluent Limit Calculations

In determining effluent limits, the Central Valley Water Board did not allow credit for effluent dilution by the receiving water. Effluent limits, therefore, have been established to attain all

applicable water quality criteria/objectives at the point of discharge. The Central Valley Water Board may grant a dilution credit and a mixing zone only following independent study and demonstration by the Discharger that a dilution credit is appropriate.

Determination of Effluent Limits for CTR Constituents and Toxicity

Reasonable Potential Analysis

USEPA regulations at 40 CFR 122.4 (d) require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numerical water quality standard. The *National Toxics Rule* (NTR) establishes water quality criteria for toxic pollutants applicable to the Discharger at 40 CFR Part 131.36. On May 18, 2000, water quality criteria of the NTR were supplemented by criteria of the *California Toxics Rule* (CTR) at 40 CFR 131.38. The NTR, CTR, and the Basin Plan contain water quality standards applicable to the discharge. The State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (the State Implementation Policy or SIP), which contains guidance on implementation for the NTR and CTR.

From October 2001 through November 2002, the Discharger collected effluent and receiving water samples for analysis of the NTR/CTR toxic priority pollutants. Analyses were performed and reported in accordance with procedures established by the SIP. Analytical results were generated for volatile and semi-volatile substances, metals, 2,3,7,8-TCDD dioxin, and sixteen dioxin congeners. Because the upgraded treatment system will produce a much higher quality effluent (activated sludge followed by filtration) the previous CTR sampling is not representative of the effluent from the new plant. This Order requires the Discharger to sample for CTR constituents again once the new treatment system is operational so that a determination can be made as to whether additional effluent limits are required. The results of sampling the receiving water in Agricultural Drain C is still valid and is not required to be repeated.

Acute and Chronic Toxicity

The Basin Plan includes a narrative water quality objective for toxicity that requires receiving waters to be free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. The Basin Plan also requires, at a minimum, 96-hour bioassays to evaluate compliance with the narrative objective, and, where appropriate, acute toxicity limitations and monitoring must be required. Section 4 of the SIP requires chronic toxicity monitoring to be conducted to demonstrate compliance with narrative toxicity objectives. This Order implements both the Basin Plan and SIP toxicity requirements.

The State has listed the Colusa Basin Drain on the State's 303 (d) list as impaired for toxicity and several pesticides with the potential source listed as agriculture. The Central Valley Water Board has determined that the Willows WWTP (once ammonia is removed) is an unlikely contributor of toxicity or pesticides to the Colusa Basin Drain because it treats strictly domestic and commercial

type wastewater, and does not have any industrial discharges to its treatment plant. The Central Valley Water Board, therefore, is proposing to require acute and chronic toxicity monitoring to determine the need for acute and/or chronic toxicity effluent limitations and to determine compliance with the narrative objective for toxicity.

Determination of Effluent Limits for non-CTR Constituents

Chlorine

The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. Chlorine is used for disinfection of the effluent waste stream. Chlorine can cause toxicity to aquatic organisms when discharged to surface waters. USEPA recommends, in their Ambient Water Quality Criteria for the Protection of Fresh Water Aquatic Life, that chlorine concentrations not exceed 0.02 mg/L as a 1-hour average and 0.01 mg/L as a 4 day average. The use of chlorine as a disinfectant in the wastewater treatment process presents a reasonable potential that it could be discharged in toxic concentrations. An effluent limitation for chlorine has been included in the Order to protect the receiving stream aquatic life beneficial uses. The effluent limitation has been established at the USEPA recommended ambient water quality criteria for chlorine. The one-hour average limitation, rather than an instantaneous or daily maximum, will be applied for compliance determinations. A one-hour average limitation allows for continuous monitoring anomalies while protecting aquatic organisms against toxicity.

Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS) and Coliform

The beneficial uses of Agricultural Drain C, Logan Creek and GCID Lateral 26-2 include contact recreational uses and irrigation. To protect these beneficial uses, the Central Valley Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups; bacteria, parasites and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. The wastewater must be treated to tertiary standards (filtered) to protect contact recreational uses when a 20-to-1 dilution of secondary effluent is not provided in the receiving stream. DHS has developed reclamation criteria, California Code of Regulations, Title 22, Division 4, Chapter 3, (Title 22) for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, school yards and other areas of similar public access, that wastewater be adequately disinfected, oxidized, coagulated, clarified and filtered and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median. Title 22 is not directly applicable to surface waters, however the Central Valley Water Board finds that it is appropriate to apply the DHS reclamation criteria because Agricultural Drain C, Logan Creek and GCID Lateral 26-2 may be used for agriculture, and contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this

Order, but must meet the level of treatment, or equivalent, as specified in the DHS regulations and recommendations. In addition to coliform testing, a turbidity effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is also capable of reliably meeting a reduced turbidity limitation of 2 NTU as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. The application of tertiary treatment processes results in the ability to achieve lower levels for BOD and TSS than the equivalent to secondary standards prescribed in the existing permit, the BOD and TSS limitations have been revised to tertiary standards beginning on 1 March 2007 when the new treatment processes will be operational. The establishment of tertiary limits has not been previously required for this discharge, therefore, a revised schedule for compliance with the tertiary treatment requirement is included as a Provision in this Order. This revised schedule allows an additional year over the existing schedule, but is still less than 5 years. Limits from the existing permit are continued until the plant upgrade is operational.

In accordance with 40 CFR 122.45, mass limitations for BOD and TSS, based on the facility's design flow of 1.2 mgd (1.12 mgd for current design flow), are included in the permit to prevent dilution as a means of complying with concentration based effluent limitations.

Settleable Solids

The existing permit contained monthly average and daily maximum settleable solids limits of 0.1 mL/L and 0.2 mL/L, respectively. Suspended solids limits are in place and measure a similar parameter that is of greater concern in relation to water quality. This Order eliminates the settleable solids limits. With TSS limits in place, the settleable solids limits can be eliminated and still protect water quality objectives in the receiving water.

pH

The Basin Plan provides that the pH of surface waters shall not be depressed below 6.5 nor raised above 8.5 nor shall the discharge alter pH of the receiving water more than 0.5 units. Federal regulations at 40 CFR 133.102(c) describes the minimum level of effluent quality to be attained by secondary treatment facilities for pH to be within 6.0 and 9.0 units. This Order requires the pH of the effluent to be maintained within the limits of 6.0 and 9.0 pH units.

Ammonia

Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrate, and denitrification is a process that converts nitrate to nitrogen gas, which is then released to the atmosphere. The existing permit established evidence of a reasonable

potential for the plant effluent to exceed the USEPA Water Quality Criteria for ammonia and contains a limit for ammonia based on effluent pH and temperature. The Basin Plan prohibits the discharge of toxic materials in toxic concentrations. This order also includes limitations for ammonia. The effluent limitations for ammonia in the existing permit varied based on temperature and pH. Recent State Water Board decisions have determined that it is preferable to establish fixed or seasonal effluent limitations, as provided in the SIP, rather than floating limitations. Therefore, the draft permit establishes seasonal effluent limitations for ammonia based on the following:

Toxic Criteria

For protection of the Basin Plan's narrative toxicity objective, the USEPA 1999 Update of Ambient Water Quality Criteria for Ammonia provides the applicable water quality criteria. The most stringent acute ammonia criteria are applied when salmonids are present within the water column. Acute and chronic ammonia toxicity are based on the assumption that salmonids are not present and early life stages of fishes are present in the receiving water. (Note that at the temperatures of the receiving stream, the chronic criteria for early life stages present are the same as without early life stages.)

Acute Toxicity

The acute criterion, or criterion maximum concentrations (CMC), for ammonia is a function of pH, and is stated as a 1-hour average concentration. A worst-case scenario occurs when there is little to no dilution of the effluent by the receiving water. Therefore, for the acute criterion, water quality objectives need to be achieved in the effluent at the end-of-pipe. As allowed by the USEPA *Technical Support Document for Water Quality-based Toxics Control* (TSD), this Order calculates the CMC using critical conditions that are a combination of worst-case observations. The receiving water and effluent pH were evaluated to determine the critical pH for calculation of the acute criterion.

Forty nine receiving water pH observations from November 2003 through October 2005 were evaluated to determine the acute design pH. The maximum pH observation during this time was 8.3 pH units. However, due to the variability of pH sampling, using the maximum pH may be over protective. Therefore, the 90th percentile of pH readings was used to determine the acute design pH. The 90th percentile was chosen for acute toxicity since it would be protective of the short-term spikes in ammonia concentration, for which the acute criterion is designed to protect. The 90th percentile of receiving water pH was 8.0 units. In evaluating the effluent, the 90th percentile pH of 113 samples is 8.3 pH units. There are time when there is minimal dilution in the receiving water. Therefore, the acute criterion for ammonia was determined by using a pH of 8.3 units, resulting in a CMC of 4.71 mg/L, ammonia as nitrogen, calculated with salmonids absent.

Chronic Toxicity

The chronic criterion, or criterion continuous concentration (CCC), for ammonia is a function of both pH and temperature. For ammonia, the CCC is stated as a 30-day average concentration, with the highest 4-day average within the 30-day average not to exceed 2.5 times the CCC. As allowed by the TSD, the CCC is calculated using critical conditions that are a combination of worst-case observations. A worst-case scenario occurs when there is little to no dilution of the effluent by the

receiving water. The receiving water and effluent pH and temperature were evaluated to determine the critical pH for calculation of the chronic criterion.

Forty nine receiving water pH observations from November 2003 through October 2005 were evaluated to determine the chronic design pH. For the chronic criterion, the median pH observations were used. The median was chosen for chronic toxicity, because over a period of time receptors would be exposed to a more or less average ammonia concentration. Using this approach, the chronic design pH was calculated as 7.8 pH units, median pH of the receiving water. This exceeds the median effluent pH, which was calculated as 7.6 pH units, based on 113 measurements from November 2003 through October 2005. Therefore, the critical pH for calculation of the chronic criterion is 7.8 pH units.

The chronic criterion decreases as temperature increases. Since the effluent and receiving water temperatures vary seasonally, a chronic criterion was calculated for both winter (November 1 – April 30) and summer (May 1 – October 31). The effluent temperature exceeds the receiving water temperature. Therefore, the 30-day average effluent temperature was used in the calculation of the chronic criterion. Based on 53 effluent temperature measurements, the maximum winter 30-day average effluent temperature was 19.6°C and based on 53 temperature measurements the maximum summer 30-day average effluent temperature was 28.5°C. Using the chronic design pH of 7.8 units, this results in a summer chronic criterion of 1.29 mg/L, ammonia as nitrogen, and a winter chronic criterion of 2.29 mg/L, ammonia as nitrogen.

Effluent Limitations

Applying 40 CFR 122.44(d)(1)(vi)(B), effluent limitations for ammonia are included in this Order and are based on the USEPA Ambient Water Quality Criteria for the protection of the beneficial use of freshwater aquatic habitat. This Order contains final summer average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 1.1 mg/L and 2.1 mg/L, respectively and a winter AMEL and MDEL of 1.6 mg/L and 3.1 mg/L, respectively. Due to periods of minimal flow in the receiving water, a dilution credit cannot be granted. Following are the steps to calculate the effluent limits for ammonia:

Step 1: Applicable water quality criteria (C)

The USEPA Ambient Water Quality Criteria are a function of pH and temperature and are given by the following equations for criterion continuous concentration (CCC) and criterion maximum concentration (CMC):

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}}\right) \times \min\left(2.85or1.45 \times 10^{0.028 \times (25 - T)}\right) \text{ mg/L}$$

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}} \text{ mg/L}$$

NPDES NO. CA0078034

CITY OF WILLOWS AND ECO RESOURCES, INC.

WILLOWS WASTEWATER TREATMENT PLANT

GLENN COUNTY

Substituting the pH and temperature conditions selected above for summer condition gives the following criteria:

$$(1.45 \times 10^{0.028 \times (25-28.5)}) = 1.16 < 2.85$$
, therefore

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - 7.8}} + \frac{2.487}{1 + 10^{7.8 - 7.688}}\right) \times \left(1.45 \times 10^{0.028 \times (25 - 28.5)}\right)$$

CCC = 1.29 mg/L

$$CMC = \frac{0.411}{1 + 10^{7.204 - 8.3}} + \frac{58.4}{1 + 10^{8.3 - 7.204}}$$

CMC = 4.71 mg/L

Step 2: Calculate the ECA

ECA = Effluent Concentration Allowance = C + D * (C-B)

Where D = dilution credit and B = background

D = 0, therefore ECA = C

 $ECA_{CCC} = 1.29 \text{ mg/L}$

 $ECA_{CMC} = 4.71 \text{ mg/L}$

Step 3: Determine long-term average (LTA)

 $C_V = 0.6$ (actual effluent variability is unknown for the new treatment system)

ECA multiplier_{chronic99} = 0.527

ECA multiplier_{acute99} = 0.321

$$LTA_{CCC} = 1.29 * 0.527 = 0.680 \text{ mg/L}$$

$$LTA_{CMC} = 4.71 * 0.321 = 1.51 mg/L$$

Step 4: Select lowest LTA

$$LTA_{CMC} = 0.680 \text{ mg/L}$$

Step 5: Calculate water quality based effluent limits

 $C_V = 0.6$; AMEL multiplier₉₅ = 1.55 (n=4)

MDEL multiplier₉₉ = 3.11

Average Monthly Effluent Limit = 0.680 * 1.55 = 1.1 mg/L

Maximum Daily Effluent Limit = 0.680 * 3.11 = 2.1 mg/L

The above calculations are for the summer condition. The following table summarizes the calculations for both summer and winter conditions:

Table F-1
Summary of WQBEL Calculations for Ammonia

	May 1 to October 31		November 1 to April 30	
	Acute	Chronic	Acute	Chronic
pH ⁽¹⁾	8.3	7.8	8.3	7.8
Temperature (°C) (2)	N/A	28.5	N/A	19.6
Criteria (mg/L) (3)	4.71	1.29	4.71	2.29
Dilution Credit	No Dilution	No Dilution	No Dilution	No Dilution
ECA	4.71	1.29	4.71	2.29
ECA Multiplier	0.321	0.527	0.321	0.527
LTA (4)	1.51	0.680	1.51	1.21
AMEL Multiplier (95 th %)	(5)	1.55	(5)	1.55
AMEL (mg/L)	(5)	1.1	(5)	1.9
MDEL Multiplier (99 th %)	(5)	3.11	(5)	3.11
MDEL (mg/L)	(5)	2.1	(5)	3.8

Acute design pH = $8.3 ext{ (90}^{th}$ percentile effluent pH), Chronic design pH = median receiving stream pH

Time Schedule

Based on sample results in the effluent, the limitations appear to put the Discharger in immediate non-compliance. A compliance schedule was included in the existing permit. This schedule required the Discharger to obtain compliance by 1 March 2006. The required improvements have been designed and are currently under construction. Due to difficulties in securing funding for this project, the schedule has slipped slightly and the Discharger has requested additional time to meet these requirements. The Discharger is currently on schedule to assure compliance with the ammonia limits by 1 January 2007. The current treatment processes typically meet the effluent limits during the time period of April through October and in some years into November. This Order extends the date for achieving compliance with the effluent ammonia limits by one year to 1 March 2007. The total compliance schedule does not exceed 5 years.















⁽²⁾ Temperature = Maximum 30-day average seasonal effluent temperature

⁽³⁾ USEPA Ambient Water Quality Criteria

LTA developed based on Acute and Chronic ECA Multipliers calculated at 99th percentile level per sections 5.4.1 and 5.5.4 of TSD.

Limitations based on chronic LTA (LTA_{chronic} < LTA_{acute})

MONITORING AND REPORTING

Section 308 of the CWA and USEPA regulation 40 CFR 122.44 (i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. The Discharger is responsible for conducting monitoring and for reporting the results to the USEPA using Discharge Monitoring Reports. The self-monitoring program requires monitoring of receiving water, influent and effluent, storm water, and sludge.

The Monitoring and Reporting Program retains influent monitoring for BOD and suspended solids to allow determination of removal efficiencies for these wastewater characteristics through treatment steps. Receiving water sampling stations and monitoring requirements are also retained from Order No. R5-01-066; however the proposed Order includes a requirement for sampling and analysis of the CTR pollutants in receiving water to coincide with similar monitoring of effluent.

Effluent monitoring requirements for flow, pH, chlorine, total suspended solids, BOD₅, coliform bacteria, and chronic toxicity are retained from Order No. R5-01-066. Acute and chronic toxicity testing are required to be conducted to determine compliance with the receiving water narrative objective for toxicity. Monitoring for CTR pollutants is required to be done for one year after the new plant processes are placed into operation, coinciding with receiving water monitoring (at Discharge Point 002) for the CTR pollutants to allow assessment of the need for effluent limitations for the priority pollutants.